Abstract

In accordance with the present invention, an optical device is provided that includes an NxN network, where N is an integer greater than or equal to 2. The network has N input ports for receiving optical input energy and N output ports for providing optical output energy. The optical output energy at each of the output ports arises from interference among the optical input energy received at the input ports. (N-1) feedback paths optically couple (N-1) of the input ports of the NxN network to (N-1) of the output ports of the NxN network. A first optical waveguide, which is provided for receiving an input optical signal, is coupled to a remaining one of the input ports of the NxN network. A second optical waveguide, which is provided for the exit of an output optical signal, is coupled to a remaining one of the output ports of the NxN network. Finally, an active element is provided which selectively supplies gain or loss to optical energy in at least one of the feedback paths. The optical device may be employed as a dispersion compensator or an amplifier.